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<h1>TRANSMITTAL FORM</h1> <p><i>(to be used for all correspondence after initial filing)</i></p>		Application Number	10/694,884-Conf. #4111
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		First Named Inventor	Koji KANDA
		Art Unit	2837
		Examiner Name	R. D. McCloud
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ENCLOSURES (Check all that apply)		
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
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Signature			
Printed name	Michael K. Mutter		
Date	December 27, 2006	Reg. No.	29,680



Docket No.: 1560-0401P
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Koji KANDA

Application No.: 10/694,884

Confirmation No.: 4111

Filed: October 29, 2003

Art Unit: 2837

For: VEHICLE STEERING APPARATUS

Examiner: R. D. McCloud

APPLICANT'S BRIEF IN REPLY TO THE EXAMINER'S ANSWER

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The following remarks are provided to address the issues raised in the Examiner's Answer dated October 30, 2006.

THE EXAMINER'S ANSWER MISINTERPRETS THE REFERENCES

The Examiner's Answer questions the difference between the power steering systems of Discenzo and Kurishige and seems to suggest that Kurishige might be directed to a steer-by-wire system. ("Kurishige et al is in fact silent with respect to the type of power steering system." Examiner's Answer, page 6.) It is respectfully submitted that one skilled in the art would recognize Kurishige as being directed to a power steering system with mechanical connections between steering wheel and vehicle wheels like the system described at column 1, lines 7-18, of Discenzo. This is because Kurishige includes a torque sensor 1 for sensing the torque generated on a steering column when a driver turns a steering wheel and a motor 8 for generating assist torque to help the driver turn the steering wheel. The amount of assist torque generated is related

to how hard the driver turns the steering wheel (Kurishige, column 1, lines 44-54, and column 2, lines 1-7). Based on these statements, one skilled in the art of power steering systems would not understand Kurishige to show a steer-by-wire system, which type of system operates based on the detected position of a steering wheel (Discenzo, column 1, lines 20-22) and in which a “driver is not provided with any feedback of the torque and torque fluctuations occurring in the steering system” (Discenzo, column 1, lines 30-31).

The Examiner’s Answer indicates that Discenzo describes an “assist torque” at column 2, lines 54-60 and at column 1, lines 35-50. These portions of Discenzo, however, discuss providing resistance to the steering wheel using a servo-motor 38. Page 2, lines 1-14 of the present specification describe how such a “reaction force actuator” is used to resist movement of a steering wheel and provide the driver with a feel similar to that produced by power steering systems with mechanical connections between the steering wheel and vehicle wheels. A reaction motor works against the actions of the driver and does not in any manner provide “assist torque.” These comments suggest a misunderstanding of the operation of the applied references. All rejections seem to be based on the incorrect assumption that Discenzo’s servo motor is providing assist torque. Nothing in the record suggest that assist torque is generated by a steer-by-wire system, and Discenzo’s servo motor 38 does not provide assist torque. To the extent the rejections are based on the erroneous assumption that Discenzo’s servo motor provides “assist torque” these rejections are respectfully traversed. The lack of motivation for modifying Discenzo is addressed below.

A MOTIVATION FOR MODIFYING DISCENZO HAS STILL NOT BEEN PROVIDED

Discenzo uses a torque sensor 36 to detect the torque produced by vehicle wheels traveling over a road, and this detected torque is used control a reaction motor connected to the steering wheel to provide what Discenzo describes as “road feel.” The invention of claim 1 is a steering apparatus that applies a reaction force to a steering wheel based on an extracted component of current from the motor used to drive a vehicle’s wheels. The rejection of claim 1 is based on the statement that it would have been obvious to modify Discenzo in some manner to produce the claimed invention.

Applicant originally interpreted this rejection as requiring the removal of Discenzo's torque sensor 36 and argued in the Appeal Brief that a proper motivation for this modification had not been identified. The examiner explains in the Examiner's Answer, however, that the modification being proposed for Discenzo is the addition of a current sensor to Discenzo without removing Discenzo's torque sensor 36. Thus modified, Discenzo would have a torque sensor and would also sense motor current. No reason for sensing Discenzo's motor current is provided, however. Since the modified Discenzo reference would already include a torque sensor for sensing torque, one skilled in the art would have no reason to add a current sensor to Discenzo for the reasons stated in the Examiner's Answer.

No reason has been provided to show why one skilled in the art would either remove Discenzo's torque sensor or add a current sensor to Discenzo. Even under the interpretation of Discenzo presented in the Examiner's Answer, it is respectfully submitted that a proper motivation for modifying the references has not been provided. Other statements in the Examiner's Answer that might be interpreted as statements of motivation are addressed below.

The Examiner's Answer indicates that both Discenzo and Kurishige disclose power steering apparatuses. This is true, but does not constitute a motivation for modifying Discenzo.

The Examiner's Answer also suggests that Discenzo should be modified to "reduce discomfort to the driver." As discussed below, the "discomfort" referred to by the examiner is produced by power steering systems like Kurishige's that generate assist torque, not by steer-by-wire systems like the one of Discenzo. Steer-by-wire systems like the one in Discenzo do not use assist torque and thus do not suffer from the problems of Kurishige's system. The record does not in any manner suggest that a driver using Discenzo's system will feel uncomfortable torque oscillation. There is therefore no reason to look to Kurishige's patent to solve a problem that doesn't exist in Discenzo's system.

Kurishige explains the problem of driver discomfort as follows:

These compensating currents are added to the assist torque current to compute a target current, and the current controller 7 controls a drive current to be supplied to the motor 8 based on the target current to generate assist torque proportional to the drive current, thereby reducing the steering torque of the driver and stabilizing the movement of the steering wheel. The controllers 3, 4 and 5 change control parameters according to car speed.

The assist torque current computed by the torque controller 3 takes a value almost proportional to the output signal of the torque sensor 1 whose frequency characteristics have been improved by the phase compensator 2. At this point, the larger the torque proportional gain set by the torque controller 3 the greater the assist torque becomes, thereby making it possible to reduce the steering torque of the driver. However, when the torque proportional gain is increased, oscillation of a control system occurs and the driver feels uncomfortable torque oscillation. Therefore, the torque proportional gain cannot be simply increased.

(emphasis added) (Kurishige, column 1, line 67 to column 2, line 18).

In the steer-by-wire system of Discenzo, the steering wheel is not mechanically connected to the motor controlling vehicle wheel position and a driver will not feel torque oscillations. One skilled in the art would have no reason to look to Kurishige to eliminate discomfort that is not present in Discenzo. The statements about reducing driver discomfort therefore also fail to show a motivation for modifying Discenzo.

The last alleged motivation for modifying Discenzo is the statement that torque is proportional to current. (“Therefore it would have been obvious ... to modify the apparatus of Discenzo to sense current as taught by Kurishige et al since torque and current are proportional.” Examiner’s Answer, page 9). Applicant does not dispute that a relationship exists between current input to a typical motor and the torque output from that motor, at least over certain operating ranges. This fact, however, in no manner suggests that Discenzo should be modified. One skilled in the art may be aware of this relationship between input current and output torque, but this relationship provides no suggestion to modify Discenzo. Discenzo, for example, may have been aware of this relationship, but he chose to use a separate torque sensor for measuring torque. Moreover, the fact that a relationship exists between current input to a motor and torque output from the motor in no manner suggests that an extracted component of the motor current can or should be used to drive a reaction force motor instead of or in addition to the information provided by Discenzo’s torque sensor. It is therefore respectfully submitted that statements about torque and current in no manner suggest the modification to Discenzo proposed by the examiner.

At most, the Examiner’s Answer seems to suggest that it might be possible to modify

Discenzo to arrive at the claimed invention. However, the fact that a modification is possible does not establish a motivation for making that modification. MPEP 2143.01. The only motivation for making changes to Discenzo appears to come, with impermissible hindsight, from Applicant's present patent application. Because a proper motivation for modifying Discenzo has not been provided, it is respectfully maintained that a prima facie case of obviousness has not been presented and that all rejections based on the combination of Discenzo and Kurishige should be withdrawn.

THE MODIFICATION SUGGESTED BY THE EXAMINER WOULD
RENDER DISCENZO INOPERABLE

In the Examiner's Answer, the examiner proposes to modify Discenzo by adding a current sensor to Discenzo so that Discenzo will have both a torque detector and a current sensor (Examiner's Answer page 7, lines 1-9). Presumably, this sensed current would be provided to Discenzo's road feel computer. However, it is not clear how Discenzo's road feel computer would use this sensed current in addition to the information from torque sensor 36. The modified Discenzo would have to provide road feel to a driver in some undisclosed manner based on both the output of torque sensor 36 and on sensed current. Since Discenzo does not disclose any mode of operation that would use such dual inputs, the modification would appear to render Discenzo inoperable. As provided by MPEP 2143.01, there can be no motivation to modify a reference in a manner that will render it inoperable or unsatisfactory for its intended purpose. For this reason as well, it is respectfully submitted that a proper motivation for modifying Discenzo has not been provided and that all rejections based on a combination of Discenzo and Kurishige should be withdrawn.

CONCLUSION

For the foregoing reasons and the reasons presented in Applicant's Appeal Brief on September 11, 2006, the withdrawal of the rejections of claims 1-21 under 35 U.S.C. 103(a) as being unpatentable over Discenzo in view of Kurishige and the allowance of claims 1-21 is earnestly solicited.

Dated: December 27, 2006

Respectfully submitted,

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